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Kinetics of the dynamical information shannon entropy for complex systems

Yulmetyev R., Yulmetyeva D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Kinetic behaviour of dynamical information Shannon entropy is discussed for complex systems: physical systems with non-Markovian property and memory in correlation approximation, and biological and physiological systems with sequences of the Markovian and non-Markovian random noises. For the stochastic processes, a description of the information entropy in terms of normalized time correlation functions is given. The influence and important role of two mutually dependent channels of the entropy change, correlation (creation or generation of correlations) and anti-correlation (decay or annihilation of correlation) is discussed. The method developed here is also used in analysis of the density fluctuations in liquid cesium obtained from slow neutron scattering data, fractal kinetics of the long-range fluctuation in the short-time human memory and chaotic dynamics of R-R intervals of human ECG.